Veterinary Services
National Emergency Operations Center

CEAH Support of GIS and Spatial Analysis in Emergency Operations

Present support

- Development of spatial data methods for recording and reporting disease information in emergency situations.

- Establishment of multiple methods for mapping livestock concentration facilities. A formal proposal for VS to create a national spatial database of first points of livestock concentration was submitted to OSS/EP in Riverdale.

- Creation of rapidly-accessed, spatially-referenced data libraries that contain information on:
  - geographic distribution of VS program and non-program diseases in the U.S., Mexico, and Central America
  - world weather/climate (past 50 years)
  - global distribution of vegetation from current satellite imagery
  - wildlife distributions
  - geographic occurrence of arthropod vectors of animal diseases
  - waterfowl migration routes
  - trade and economic data linked to specific geographic areas
  - livestock census data attached to boundary maps
  - human census data attached to boundary maps
  - collection of Landsat and SPOT satellite digital imagery
  - emergency management official contacts and disease specialists by geographic area

- Holding of two conferences on GIS in APHIS in which major sections of the program were devoted to GIS applications in animal and plant emergencies.

- Establishment of recommended standard procedures for using of global positioning system (GPS) receivers.

- Development of spatial data collection and analysis methods for national-level disease surveillance.

- Creation of raster-based spatial models (grid models), using both two- and three-dimensional surfaces, to model:
  - disease incidence, prevalence, and attack rates
  - serological and other laboratory observations
  - animal population estimates based on rapid sampling methods
  - spatial impact of vaccination efforts

- Field procedures for detecting the emergence of new pathogens using GIS, remote sensing, and spatial analysis are currently being developed and tested in Mexico, Colombia, Venezuela, and Peru.

- Training materials, including performance-based training manuals, have been produced for teaching GIS and spatial data analysis to emergency personnel.

Peacetime support

- Implement a national mapping program to locate and spatially-reference first points of concentration of livestock.

- Continued development and expansion of spatially-referenced data libraries with increased emphasis on large-scale (small area) data pertinent to support emergency operations.

- Build a collection of spatial surface model applications that address a range of potential emergency scenarios. These surface models would be tested in READEO exercises.

- Conduct spatial trend analyses using spatially-referenced surveillance data to detect changes that may foretell an impending emergency.

- Provide recommendations on hardware, software, and methods for the proper collection, analysis, interpretation, and reporting of geographically-based disease data.

- Conduct specialized training on the use of GIS and spatial analysis in emergency operations to FADD, EP staff, and others expected to be involved with emergency operations.

Outbreak support

- Implement previously developed spatial data collection procedures as recommended by participants attending the GIS in APHIS conferences held in 1997 and 1998.

- Provide technical support to ensure that the spatial data are being collected accurately and entered correctly into a disease reporting database.

- Provide emergency managers with rapid access to base-map data for the development of intervention strategies.

- Provide emergency managers with ancillary data regarding livestock populations, concentration points, transportation systems, wildlife data, and official points-of-contact at local and state levels.

- Provide on-site spatial statistical analysis, predictive surface modeling, and spatial trend analysis to assist in establishing point sources and predicting the rate and direction of spread of a disease agent.

- Provide logistical support to make sure that emergency field staff have an adequate supply of GPS receivers and have knowledge about the correct use of this equipment.

- Create and distribute up-to-date maps reflecting the status of an emergency situation. Serve as a liaison with state, local, and private agencies responsible for collecting spatial data within the geographic region where the emergency is occurring.